

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (ORIGINAL) A method for driving a liquid-jet head comprising a passage-forming substrate in which pressure generating chambers communicating with nozzle orifices are formed; and a piezoelectric element provided on one surface of said passage-forming substrate via a vibration plate, said piezoelectric element consisting of a lower electrode, a piezoelectric layer, and an upper electrode, wherein

said piezoelectric layer consists of a relaxor ferroelectric,

a voltage between a potential V_1 , at which a capacitance of said piezoelectric element is maximal in a capacitance-potential curve of said piezoelectric element, and a potential V_2 , which has a larger absolute value than an absolute value of said potential V_1 and at which an inflection point in said capacitance-potential curve is reached, is set as a drive start potential V_0 , and

said piezoelectric element is driven using a drive waveform having an ejection step for changing a potential from said drive start potential V_0 to a potential V_3 , at which a driving electric field having an electric field strength of 100 to 500 kV/cm is generated in said piezoelectric layer, to contract said pressure generating chamber, thereby ejecting liquid droplets through said nozzle orifice.

2. (ORIGINAL) The method for driving the liquid-jet head according to claim 1, wherein said drive waveform has, before said ejection step, a first expansion step for changing

the potential from an intermediate potential, which has polarity identical with polarity of said drive start potential V_0 and has a larger absolute value than an absolute value of said drive start potential V_0 , to said drive start potential V_0 to expand said pressure generating chamber.

3. (ORIGINAL) The method for driving the liquid-jet head according to claim 1, wherein said drive waveform has, after said ejection step, a second expansion step for changing the potential from said potential V_3 to an intermediate potential, which has polarity identical with polarity of said potential V_3 and has a smaller absolute value than an absolute value of said potential V_3 , to expand said pressure generating chamber.

4. (ORIGINAL) The method for driving the liquid-jet head according to claim 1, wherein said drive waveform further has, after said ejection step, a relaxation step for changing the potential from a predetermined intermediate potential to a potential V_4 , which has polarity identical with polarity of said drive start potential V_0 and has a smaller absolute value than an absolute value of said drive start potential V_0 , and then returning the potential from said potential V_4 to said intermediate potential.

5. (ORIGINAL) The method for driving the liquid-jet head according to claim 1, wherein said drive waveform further has, after said ejection step, an initialization step for changing the potential from a predetermined intermediate potential to a potential V_5 , which is $-V_3$, and then returning the potential from said potential V_5 to said intermediate potential.

6. (ORIGINAL) The method for driving the liquid-jet head according to claim 1, wherein a film thickness of said piezoelectric layer is 0.5 to 1.0 μm .

7. (CURRENTLY AMENDED) The method for driving the liquid-jet head according to ~~any~~ one of claims 1 to 6, wherein said passage-forming substrate consists of a single crystal silicon substrate, and each layer of said piezoelectric element is formed by film deposition and lithography.

8. (ORIGINAL) A liquid-jet apparatus mounted with a liquid-jet head comprising a passage-forming substrate in which pressure generating chambers communicating with nozzle orifices are formed; and a piezoelectric element provided on one surface of said passage-forming substrate via a vibration plate, said piezoelectric element consisting of a lower electrode, a piezoelectric layer, and an upper electrode, wherein

said piezoelectric layer consists of a relaxor ferroelectric,
a voltage between a potential V_1 , at which a capacitance of said piezoelectric element is maximal in a capacitance-potential curve of said piezoelectric element, and a potential V_2 , which has a larger absolute value than an absolute value of said potential V_1 and at which an inflection point in said capacitance-potential curve is reached, is set as a drive start potential V_0 , and

said liquid-jet apparatus further comprises drive means for outputting a drive waveform to said piezoelectric element, said drive waveform having an ejection step for changing a potential from said drive start potential V_0 to a potential V_3 , at which a driving electric field having an electric field strength of 100 to 500 kV/cm is generated in said piezoelectric layer, to

AMENDMENT UNDER 37 C.F.R. §1.111
Application Number: 10/761,416

Our Ref: Q79453
Art Unit: 2853

contract said pressure generating chamber, thereby ejecting liquid droplets through said nozzle orifice.